

What is claimed is:

[Claim 1] 1. In an indoor facility having an enclosed volume to be humidity controlled, a dehumidification system comprising: an air handling system having a process conduit and a regeneration conduit, a return line fluidly connecting the enclosed volume with an inlet of said process conduit and establishing a process air flow therethrough; means for supplying ambient air to said return line; a supply line fluidly connecting an outlet of said process conduit with the enclosed volume; an aqueous liquid refrigeration system for maintaining a cooling load in said volume; a dehumidification coil in said process conduit operatively connected with said liquid refrigeration system; rotating desiccant means in said air handling system having a first portion disposed in said process conduit and a second portion disposed in said regeneration conduit; fan means in said regeneration conduit for conducting ambient air from an inlet to an outlet; a primary refrigeration system including a compressor thermally coupled with said secondary refrigeration system; waste heat exchange means in said regeneration conduit thermally coupled with said compressor for heating said second portion of said desiccant means to an elevated temperature in said regeneration conduit and for thereby removing in said process conduit a first portion of moisture from said process air flow; and dehumidification means in said process conduit for reheating and removing a second portion of moisture from said process air flow supplied to said supply line.

[Claim 2] 2. The system as recited in claim 1 wherein said waste heat exchange means heats said second portion of said desiccant means to about 50 to 100 F. deg.

[Claim 3] 3. The system as recited in claim 2 wherein said reheating in said process conduit heats said process air flow to about 50 to 70 F. deg.

[Claim 4] 4. The system as recited in claim 3 wherein said liquid refrigeration system uses a refrigerant liquid selected from the group of glycols and brines.

[Claim 5] 5. The system as recited in claim 4 wherein said glycols includes ethylene glycol and propylene glycol.

[Claim 6] 6. The system as recited in claim 4 wherein brines include calcium chloride, sodium chloride or organic salt solutions.

[Claim 7] 7. A dehumidification system for an indoor facility having a cooling load coupled with a secondary liquid refrigeration system which is coupled with a direct expansion refrigeration system including a compressor generating waste heat, a dehumidification system comprising: air handling means having a process flow means and a regeneration flow means, said process flow means receiving humid air from said facility and returning dehumidified air to said facility, said regeneration flow means discharging air to the exterior; dehumidification coil means thermally coupled with said secondary liquid refrigeration system in said process flow means for removing a first portion of moisture from said humid air to a dew point of below about 36° F.; desiccant means in said air handling means rotating between said process flow means and said regeneration flow means, said desiccant means removing a second portion of moisture from said humid air received in said process flow means from said dehumidification coil means and for reheating said humid air to about 50° to 70° F, said desiccant means in said regeneration flow means being heated to about 50° to 100° F and discharging said second portion of moisture to said regeneration flow means.